WHAT IS CLAIMED IS:

1. A leakage detecting method for use in an oxidizing system of forming an oxide layer, the method comprising the steps of:

(a) providing an oxidizing system having an oxidizing chamber and an oxygen concentration analyzer installed in a bypass of an exhaust pipe of said oxidizing chamber;

(b) performing an oxidizing process on a test wafer in a test run under a specified operating condition in said oxidizing system by flowing an oxidizing gas through said oxidizing chamber containing said test wafer;

(c) measuring an oxygen concentration of said oxidizing gas exiting said oxidizing chamber in said test run by said oxygen concentration analyzer;

(d) measuring the oxide thickness of said test wafer after said test run;

(e) repeating (b), (c), and (d) for a plurality of test runs to obtain a correlation between the measured oxygen concentration and the oxide thickness for the plurality of test runs to identify an acceptable oxygen concentration corresponding to a maximum acceptable oxide thickness, wherein an oxygen concentration greater than said acceptable oxygen concentration indicates gas leakage in said oxidizing system;

(f) selecting a safety factor and multiplying said acceptable oxygen concentration with said safety factor to get a threshold oxygen concentration;

(g) performing a general oxidizing process on a working wafer under said specified operating condition in said oxidizing system; wherein while said oxygen concentration analyzer starts to measure an oxygen concentration of said oxidizing gas exiting said oxidizing chamber, if said measured oxygen concentration is greater than said threshold oxygen concentration, an indication of gas leakage exists in said general oxidizing system.

2. The method of claim 1 wherein said maximum acceptable oxide thickness is about 20 Å.

3. The method of claim 1 wherein said specified operating condition comprises a temperature from about 700 °C to 1200 °C and an oxidizing time period from about 10 to 20 minutes.

4. The method of claim 1 wherein said safety factor is about 0.9.

5. The method of claim 1 further comprising introducing an inert gas into said oxidizing system to purge said oxidizing system prior to performing said oxidizing process.

6. The method of claim 5 wherein said inert gas comprises nitrogen.

7. The method of claim 1 further comprising at least one action of re-tightening one or more connectors and welding one or more pipes in said oxidizing system, upon detecting a gas leakage in said oxidizing system when said measured oxygen concentration is greater than said threshold oxygen concentration.

8. The method of claim 1 further comprising ascertaining that there is no gas leakage in said oxidizing system when the measured oxygen concentration is lower than said threshold oxygen concentration, and performing an oxidizing process on at least one working wafer under said specified operating condition in said oxidizing system to form the oxide layer on said working wafer.

9. A method for estimating a thickness of an oxide layer formed on a wafer, the method comprising:

providing an oxidizing system having an oxidizing chamber for forming an oxide layer on one or more substrates by flowing an oxidizing gas through said oxidizing chamber;

placing a working wafer in said oxidizing chamber of said oxidizing system;

performing an oxidizing process on said working wafer under a specified operating condition to form an oxide layer on said working wafer by flowing said oxidizing gas through said oxidizing chamber;

measuring an oxygen concentration of said oxidizing gas exiting said oxidizing chamber; and

estimating a thickness of said oxide layer according to said measured oxygen concentration and a previously determined relation between oxide layer thicknesses formed on test substrates placed in said oxidizing chamber and oxygen concentrations of gases exiting said oxidizing chamber in test runs of oxidizing processes performed on the test substrates under said specified operating condition.

10. The method of claim 9 wherein the previously determined relation is obtained by:

performing oxidizing processes on a plurality of test wafers in a plurality of test runs under said specified operating condition in said oxidizing system to form oxide layers on the test wafers having a plurality of oxide thicknesses for the plurality of test runs by flowing said oxidizing gas through said oxidizing chamber containing said test wafers;

measuring an oxygen concentration of said oxidizing gas exiting said oxidizing chamber in each of said plurality of test runs; and

obtaining the relation between said measured oxygen concentrations and the oxide thicknesses for the plurality of test runs to identify a threshold oxygen concentration corresponding to a maximum acceptable oxide thickness, wherein an oxygen concentration greater than said threshold oxygen concentration indicates gas leakage in said oxidizing system.

11. The method of claim 10 wherein said maximum acceptable oxide thickness is about 20 Å.

12. The method of claim 9 wherein said specified operating condition comprises a temperature from about 700 °C to 1200 °C and an oxidizing time period from about 10 to 20 minutes.

13. The method of claim 9 further comprising, prior to placing a working wafer in said oxidizing chamber, performing a checking procedure to ascertain that there is no leakage in said oxidizing system according to said previously determined relation between oxide layer thicknesses formed on test substrates placed in said oxidizing chamber and oxygen concentrations of gases exiting said oxidizing chamber.

14. The method of claim 13 wherein performing a checking procedure comprises:

placing a working wafer in said oxidizing chamber of said oxidizing system;

performing an oxidizing process on said working wafer under said specified operating condition to form an oxide layer on said working wafer by flowing said oxidizing gas through said oxidizing chamber;

measuring an oxygen concentration of the oxidizing gas exiting said oxidizing chamber; and

determining whether there is gas leakage in said oxidizing system by comparing said measured oxygen concentration with said threshold oxygen concentration multiplied by a safety factor, wherein there is no gas leakage in said oxidizing system when said measured oxygen concentration is lower than said threshold oxygen concentration multiplied by said safety factor.

15. The method of claim 14 wherein said safety factor is about 0.9.

16. The method of claim 14 further comprising introducing an inert gas into said oxidizing system to purge said oxidizing system prior to performing said oxidizing process on said working wafer.

17. The method of claim 16 wherein said inert gas comprises nitrogen.

18. The method of claim 9 wherein said oxygen concentration of said oxidizing gas exiting said oxidizing chamber is measured by an oxygen analyzer disposed downstream of said oxidizing chamber.